

BOTTOM FAUNA OF THE MALACCA STRAIT

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ABSTRACT

Bottom fauna of Malacca Strait (connecting the Indian Ocean with Pacific) in the depth range of 80 to 1350 m, is dominated by meiofauna which exceeds macrofauna by 12.5 times in weight and by more than 780 times in population density. Standing crop of bottom fauna is high (11.79 g m^{-2}) and is dominated by Indo-Pacific species.

Distribution and abundance of fauna is discussed in relation to environmental conditions.

The Malacca Strait lies between Latitudes $8^{\circ}30'$ & 1°N and Longitudes 96° & 105°E and connects the Indian Ocean with the Pacific. It has been the subject of investigation for a number of oceanographic expeditions, but except for a short note by Neiman (1973) our present knowledge about the benthos of this area is very scanty.

During the RV *Gaveshani* cruises (Nos. 66 and 67) in January 1980, seven stations in the depth range of 80 to 1350 m were occupied for studying the bottom fauna, both macro and meio, of Malacca Strait. Collection, processing and analysis of water, sediment and benthos samples, were done by the procedure, reported earlier (Parulekar, Nair, Harkantra and Ansari, 1976).

Only five standard samples (Parulekar and Ansari, 1980) have been considered for the quantitative studies and the details about station position, depth and environmental factors, pertaining to benthic life are presented in Table I. The water temperature which was between 25 and 26.06°C at shallow ($<100 \text{ m}$) stations showed a decrease of more than 15°C at mid-depths (300-500 m) followed by a gradual decrease with increasing depth. The salinity values were higher at mid-depths than either at shallow or deeper waters above 1000 m. Dissolved oxygen values were moderate ($>2.5 \text{ ml/l}$) at shallow depths; lowest ($<1 \text{ ml/l}$) at mid-depths and intermediate at greater depths. On an average the oxygen saturation was found to be low ($\bar{x} = 1.95 \text{ ml/l}$). The bottom deposits were characterised by soft sediments (silt or clay) with varying admixture of sand and shell fragments.

Benthic components, from each standard sample, were separated into macro (above 0.5 mm) and meiofauna (less than 0.5 mm). The biomass of macrofauna varied (Fig. 1) from 0.15 to 70.92 g m^{-2} with a relatively high mean value of 14.54 g m^{-2} . Average meiofaunal biomass was 9.02 g m^{-2} with a range of variation between 1.03 and 26.91 g m^{-2} . Macro and meio fauna biomass distribution displayed an inverse relationship (Fig. 1) with high macrofaunal biomass at shallow stations and rich meiofaunal standing crop in waters above 300 m.

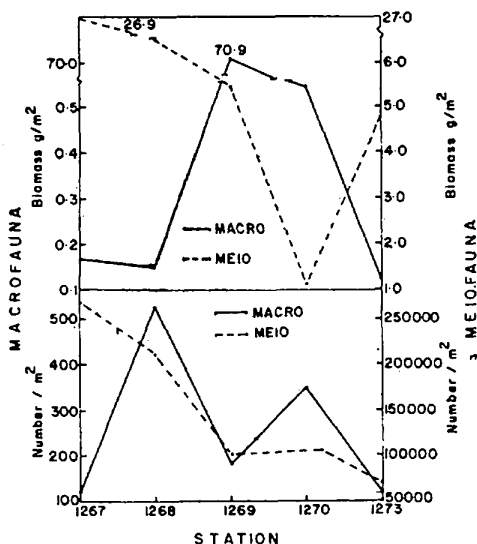


Fig. 1. Biomass and population count of macro and meiofauna in the Malacca Strait.

composition were harpacticoid copepods (22.79%), amphipods (9.14%) and mysids (4.57%). Except polychaetes, all the three remaining taxa had (Table III) low percentage of prevalence, varying from 20% (harpacticoids and mysids) to 40% (amphipods).

Among the meiofaunal taxa (Table III) nematodes had the highest prevalence (100%) and also contributed maximum (33%) to the composition. Other taxa were found in varying percentage composition and percentage of prevalence from 7% (Kinorhyncha) to 19.4% (Polychaeta) and from 40% (Kinorhyncha & Turbellaria) to 80% (Polychaetes) respectively.

Apparently no correlation between the depth or type of bottom deposits and distribution of bottom fauna was observed. However, to a certain extent the substratum characterized by sandy mud appears to harbour more fauna.

Earlier observations on the environmental characteristics of Malacca Strait have revealed that the water movements are primarily influenced by the Pacific Ocean and a

Table I. Data file of benthic sampling sites in Malacca Strait.

Sl. No.	Station Number	Geographical Lat. (N)	Position Long. (E)	Depth m	Temperature °C	Salinity ‰	Dissolved Oxygen ml/l	Sediment
1	1267	06°03'	96°30'	1350	6.53	34.78	1.56	Muddy
2	1268	05°45'	97°26'	320	10.73	35.13	0.96	Sandy mud
3	1269	05°46'	98°30'	80	25.31	33.92	2.75	Coarse sand Shell gravel
4	1270	06°44'	98°46'	90	26.06	33.65	3.50	Muddy shell fragments
5	1273	08°10'	97°00'	500	10.34	35.05	1.01	Sandy clay

The meiofauna population (Fig. 1) showed spatial variations from 7×10^3 m^{-2} to 2×10^4 m^{-2} with a high mean count of $149,000$ m^{-2} . In contrast, the mean population density of macrofauna was relatively low (258 m^{-2}) with a small range of 118 - 525 m^{-2} . Consequently, the ratio of macro to meio, both by weight and by number, showed (Table II) the overall dominance of meiofauna in the Malacca Strait. The meiofauna exceeded macrofauna, by 12.5 times in weight and by more than 780 times in population density.

The fauna was dominated by polychaetes in macrofauna and by nematodes in meiofauna (Table III). The macrofauna was represented by 4 taxa, with the polychaetes as the major group, both in composition (63.5%) and prevalence (80%). Next in order of

steady current flows throughout the year in the northeast direction towards the Indian Ocean (Wyrki, 1961). During the northeast monsoon (November–February) when the present study was carried out, the currents transport waters of relatively high salinity and low temperature which are diluted by the discharge of rivers and heavy rainfall in the northern and the north-western part of the Malacca Strait. The low oxygen values of bottom waters, as encountered in the present investigation, are presumed (Wyrki, 1961) to originate in Bay of Bengal in depths between 250 and 300 m and the oxygen deficient water is transported along the coast of Sumatra, towards southeast. Due to strong tidal currents, the vertical mixing takes place resulting in the formation of a water body intermediate in hydrographic characters between the Pacific and the Indian Ocean.

Steemann Nielson and Jensen (1957) have reported that the Malacca Strait is an area of high organic production and the average primary productivity values are more than $1 \text{ g C m}^{-2} \text{ day}^{-1}$. The bottom fauna from shallow depths of 50–70 m as observed by Neiman (1973), was relatively low and varied between 1 and 4 g m^{-2} with an overall dominance of polychaetes. But the demersal fishery resources of Malacca Strait have been reported (Shaari, 1974) to be very rich. The results of the present study indicate that the benthic production, as assessed from the average biomass value which was 11.79 g m^{-2} (macro + meio) is also relatively high, especially in contrast to the adjacent Andaman Sea (Parulekar and Ansari, 1980; Ansari and Parulekar, 1980)

Table II. Ratio of macrofauna to meiofauna-biomass and population in Malacca Strait.

Station Number	Biomass	Population
1267	1: 158	1: 2152
1268	1: 46	1: 400
1269	13: 1	1: 568
1270	1: 2	1: 288
1273	1: 5	1: 508

Table III. Benthic faunal composition (percentage) in Malacca Strait.

Taxa	Station Number				
	1267	1268	1269	1270	1273
<i>Macrofauna</i>					
Polychaeta	100	88.7	100	—	50
Harpacticoida	—	—	—	83	—
Mysidacea	—	—	—	17	—
Amphipoda	—	11.3	—	—	50
<i>Meiofauna</i>					
Foraminifera	10.5	15.3	28.5	—	—
Nematoda	31.5	30.9	43.0	33.6	33.3
Turbellaria	16.0	—	—	16.6	—
Polychaeta	21.0	23.2	—	16.6	33.3
Harpacticoida	10.5	15.3	—	16.6	—
Nauplii	10.5	—	28.5	16.6	—
Kinorhyncha	—	15.3	—	—	33.3

The composition of benthic fauna, as observed in the present study is comparable to the macro and meiofauna of other regions of the Indian Ocean (Parulekar, 1976; Ansari, Harkantra, Nair and Parulekar, 1977; Parulekar and Ansari, 1980; Ansari and Parulekar, 1980) and is in conformity with the findings of Panikkar (1967) who had pointed out that the fauna of Arabian Sea, Bay of Bengal, eastern central Indian Ocean, and the smaller seas associated with the eastern archipelago and the equatorial region is a distinct marine zoogeographical region dominated by Indo-Pacific species.

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